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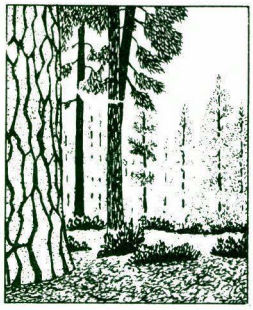
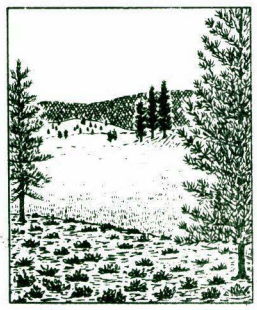


FOREST RESEARCH NOTES

CALIFORNIA FOREST AND RANGE EXPERIMENT STATION
GEORGE M JEMISON, DIRECTOR

U.S. DEPARTMENT OF AGRICULTURE – FOREST SERVICE



No. 120 February 18, 1957

INSECT-CAUSED DAMAGE TO THE 1956 DOUGLAS-FIR CONE CROP IN CALIFORNIA

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Insects caused very little damage to northwestern California's 1956 Douglas-fir cone crop. This is the main conclusion drawn from an analysis of cones collected on the Klamath and Six Rivers National Forests. Although the sample was small, it suggests how much damage insects cause in years when the cone crop is good.

Two types of insects cause most of the damage to Douglas-fir cones and seeds. These are the cone moths, mostly belonging to the genera Barbara, Dioryctria, Eupithecia, and Laspeyresia, and the seed chalcids, represented by the Douglas-fir seed chalcid, Megastigmus spermotrophus Wachtl. Cone moth larvae mine indiscriminately through the maturing cones, destroying axil, scales, and seeds alike. Seed chalcid larvae, on the other hand, remain within individual seeds and feed on the developing embryo.

Sampling

To get a measure of the 1956 insect-caused loss, cones were collected in late August from eight locations throughout the Douglas-fir region. Trees of all sizes bore cones in 1956, and the collection showed no significant difference between percentages of infested cones on large and small trees. At least 50 cones were picked at each location.

The cones were stored indoors until they were examined in December. The analysis was designed to sample both cone moth damage and loss of seed caused by chalcids. Moth damage was determined by examining 50 cones from each lot, the damage being identified by frass, pitch, and holes in the cone scales. Chalcid work was sampled by cutting 500 seeds from each lot. Only the seeds which appeared to be fully developed were selected for this test. Many seeds in the basal part of a Douglas-fir cone never fill up; such seeds were not examined. The seeds were classified as sound, hollow, and infested, and infested seed were identified by the presence of chalcid larvae.

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Results

The samples showed that an average of 16.5 percent of the cones were infested with cone moths, and 0.4 percent of the seeds were destroyed by seed chalcids (table 1). The percentage of the seed lost in a moth-infested cone was not determined. Some midge larvae were found infesting the cones, but they were not numerous enough to cause much damage. Of all the seeds sampled, 16.7 percent were hollow. Some of these hollow seed may have resulted from insect activity, but the possibility was not investigated in this study.

Table 1.--Douglas-fir cones and seeds damaged by insects, samples of 50 cones and 500 seeds from each location, northwestern California, 1956

Location	Moth infested cones	Chalcid infested seed	Hollow seed
	- - - - - - - - - Percent - - - - - - - - -		
No. Haystack Burn	40	0.0	16
So. Haystack Burn	16	0.0	32
Oak Knoll	20	0.8	29
Scott River	4	0.8	22
Seiad Valley	8	1.6	10
Redcap Creek	6	0.2	8
Bluff Creek	34	0.0	8
Willow Creek	4	0.0	9
AVERAGE	16.5	0.4	16.7
STANDARD ERROR	±4.9	±0.26	±4.4
SAMPLING ERROR	30	65	26